

**METHOD, APPARATUS, AND COMPUTER  
PROGRAM PRODUCT FOR MANAGEMENT  
OF CONNECTED DEVICES, SUCH AS IN A  
WIRELESS DOCKING ENVIRONMENT**

**FIELD**

[0001] The field of the invention relates to wireless communication, and more particularly to management of one or more wireless devices in a wireless docking environment.

**BACKGROUND**

[0002] Modern society has adopted, and is becoming reliant upon, wireless communication devices for various purposes, such as connecting users of the wireless communication devices with other users. Wireless communication devices can vary from battery powered handheld devices to stationary household and/or commercial devices utilizing an electrical network as a power source. Due to rapid development of the wireless communication devices, a number of areas capable of enabling entirely new types of communication applications have emerged.

[0003] Cellular networks facilitate communication over large geographic areas. These network technologies have commonly been divided by generations, starting in the late 1970s to early 1980s with first generation (1G) analog cellular telephones that provided baseline voice communications, to modern digital cellular telephones. GSM is an example of a widely employed 2nd Generation digital cellular network communicating in the 900 MHz/1.8 GHz bands in Europe and at 850 MHz and 1.9 GHz in the United States. The 3rd and 4th Generation digital cellular network communication technologies have evolved from GSM. While long-range communication networks, like the 3rd and 4th Generation digital cellular network technologies, are a well-accepted means for transmitting and receiving data, due to cost, traffic and legislative concerns, these networks may not be appropriate for all data applications.

[0004] Short-range communication technologies provide communication solutions that avoid some of the problems seen in large cellular networks. Bluetooth™ is an example of a short-range wireless technology quickly gaining acceptance in the marketplace. In addition to Bluetooth™ other popular short-range communication technologies include Bluetooth™ Low Energy, IEEE 802.11 wireless local area network (WLAN), Wireless USB (WUSB), Ultra Wide-band (UWB), ZigBee (IEEE 802.15.4, IEEE 802.15.4a), NFC (Near Field Communication), and ultra-high frequency radio frequency identification (UHF RFID) technologies. All of these wireless communication technologies have features and advantages that make them appropriate for various applications.

[0005] Due to the limitation of size and available power in a battery powered handheld device, sometimes multiple devices may be connected locally to complement each other. For example, a smartphone or a tablet may be connected to a big screen monitor and a regular keyboard for user convenience. Docking is one example of such a connected device environment, where a central device, such as a laptop, tablet, or smartphone, may be connected to one or more peripheral devices to provide additional features, functions and flexibility to a user. All of the connected devices in the docking environment, appear as one virtual feature-rich device to a user.

[0006] Traditionally, docking station hardware has been used to plug in a laptop computer for use as a desktop computer, and to directly connect it with peripherals such as a monitor, keyboard, mouse, and other common peripherals. With the availability of powerful handheld devices, such as smartphones and tablets, there is an increasing trend to provide wireless docking, using Wi-Fi for example, to connect diverse types of portable devices. In wireless docking, a Wireless Docking Center (WDC), which may be implemented as a stand-alone device, may manage a set of peripherals and a Wireless Dockee (WD), such as a laptop or smart phone, to connect the Wireless Dockee (WD) to the set of peripherals.

**SUMMARY**

[0007] Method, apparatus, and computer program product embodiments enable a wireless docking center device to manage one or more wireless and/or wired peripheral devices on behalf of a wireless dockee device. Example embodiments of the invention include wireless docking management of peripheral devices, power management in wireless docking, intelligent and automatic connection activation in wireless docking, notification based on user proximity to a peripheral device in wireless docking, and redirection of data transmission between peripheral devices in wireless docking. Wireless docking is mentioned as example herein, but similar solutions may also be applied to other connected device environments.

[0008] An example embodiment of the invention includes a method comprising:

[0009] receiving, by a wireless docking center device, at least from one or more wireless peripheral devices, capability-related information characterizing at least the one or more wireless peripheral devices;

[0010] receiving, by the wireless docking center device, from a wireless dockee device, or other capable device, planned use-related information of the wireless dockee device; and

[0011] analyzing, by the wireless docking center device, the received capability-related information and planned use-related information, and performing an action with respect to one or more wireless peripheral devices capable of performing at least a portion of services required by the planned use-related information of the wireless dockee device, based on the analysis.

[0012] An example embodiment of the invention includes a method comprising:

[0013] providing, by the wireless docking center device, information resulting from the analysis, to at least one of the wireless dockee device for user notification/information of selected ones of the one or more wireless peripheral devices capable of performing services required by the planned use-related information of the wireless dockee device and to the one or more wireless peripheral devices, for automatically performing an action with respect to one or more of the wireless peripheral devices capable of performing services required by the planned use-related information of the wireless dockee device.

[0014] An example embodiment of the invention includes a method comprising:

[0015] transmitting by the wireless docking center device, a status request to the one or more wireless peripheral devices, based on the planned use-related information of the wireless dockee device; and